



Lemhi River

Lower Lemhi River Subreach 4

Watershed Advisory Committee
Meeting

February 7, 2019



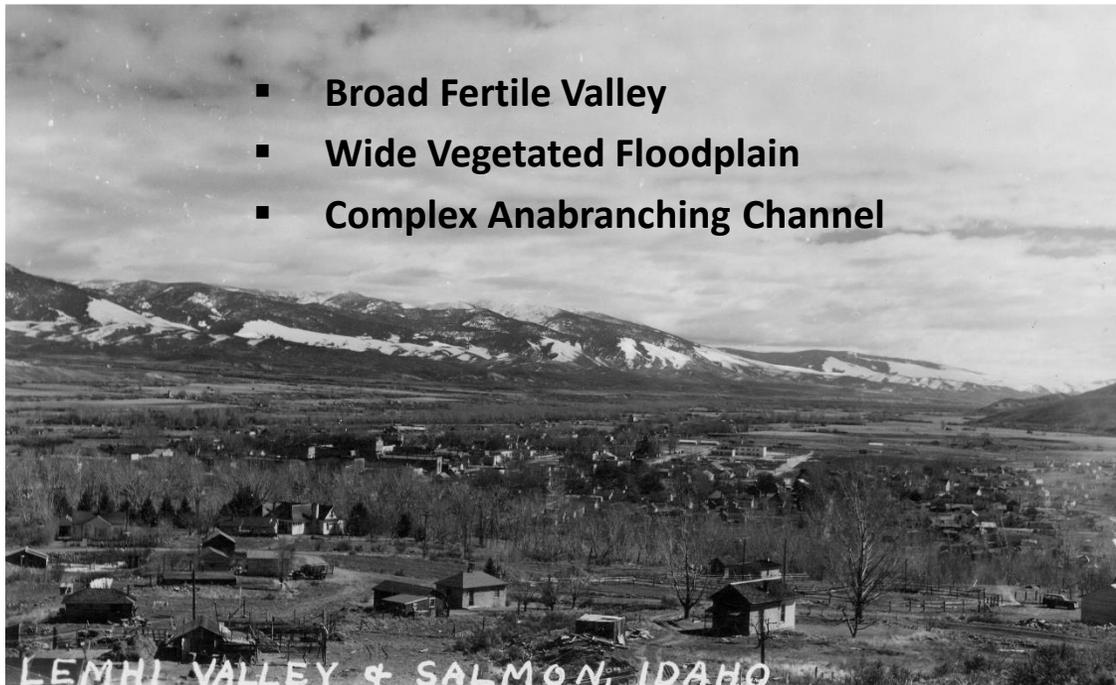
Lower Lemhi Subreach 4

Issues

1. Fish Habitat/Capacity
2. Flooding/Social

Historical Perspective Lemhi River

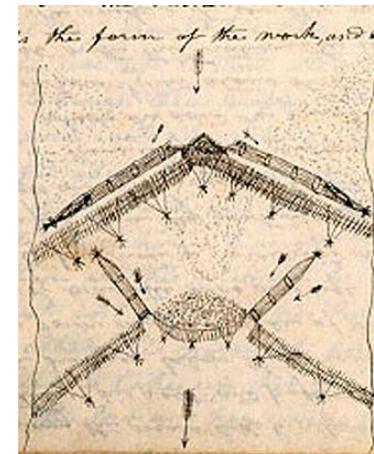
- Broad Fertile Valley
- Wide Vegetated Floodplain
- Complex Anabranching Channel



Reference to Anabranching Watershed

*.... he found the weir extended across
four channels of the river which was
here divided by three small islands.....*

**First recorded historical observation of Lemhi
Shoshone-Bannock Fishing
(Journals of the Lewis and Clark Expedition,
Moultin 1998)**

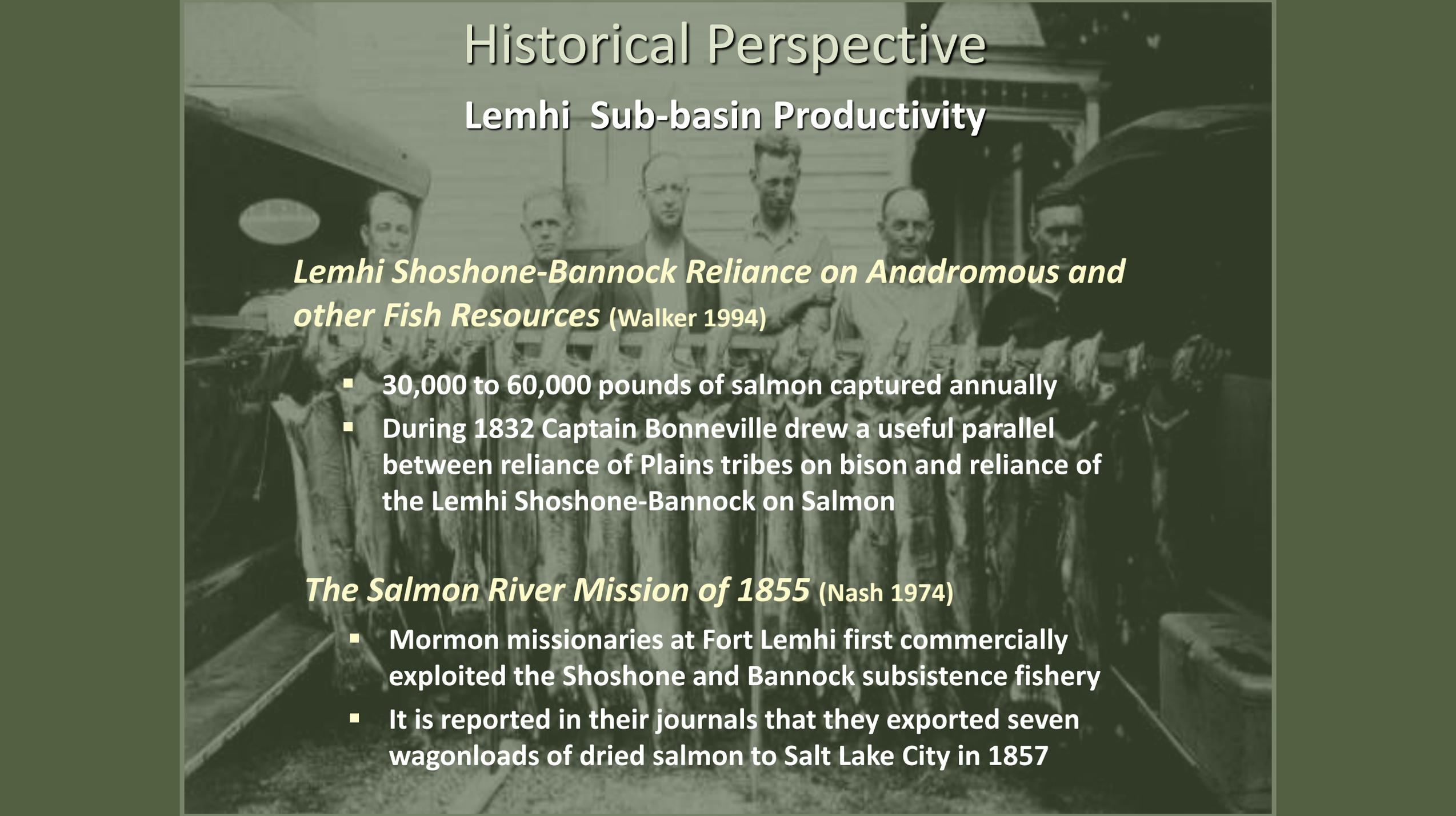


Historical Perspective – **Expansive Floodplain**



Historical Perspective – **Expansive Floodplain**





Historical Perspective

Lemhi Sub-basin Productivity

Lemhi Shoshone-Bannock Reliance on Anadromous and other Fish Resources (Walker 1994)

- 30,000 to 60,000 pounds of salmon captured annually
- During 1832 Captain Bonneville drew a useful parallel between reliance of Plains tribes on bison and reliance of the Lemhi Shoshone-Bannock on Salmon

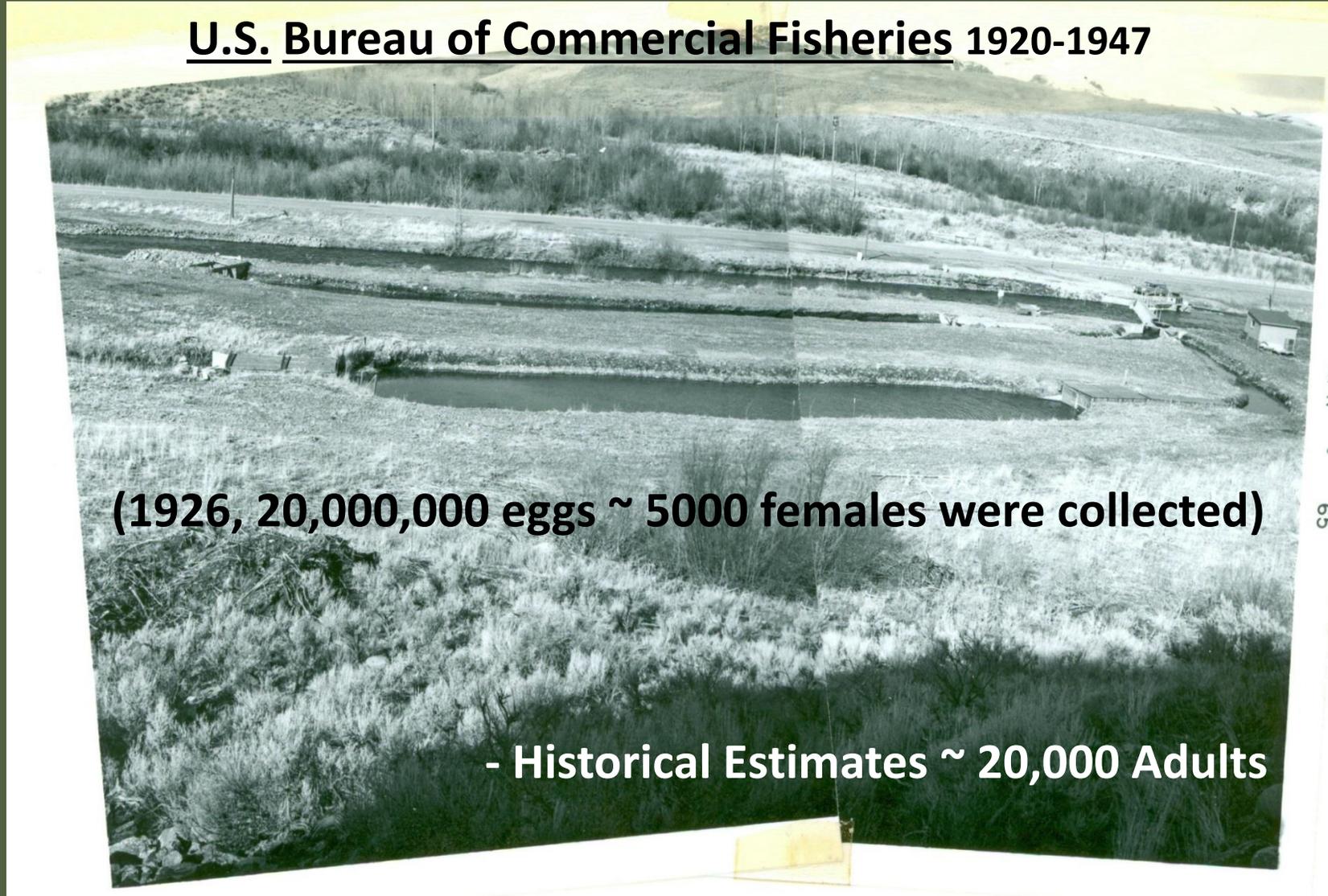
The Salmon River Mission of 1855 (Nash 1974)

- Mormon missionaries at Fort Lemhi first commercially exploited the Shoshone and Bannock subsistence fishery
- It is reported in their journals that they exported seven wagonloads of dried salmon to Salt Lake City in 1857

Historical Perspective

Lemhi sub-basin Productivity

U.S. Bureau of Commercial Fisheries 1920-1947



(1926, 20,000,000 eggs ~ 5000 females were collected)

- Historical Estimates ~ 20,000 Adults

Historical Perspective Lower Lemhi Mainstem

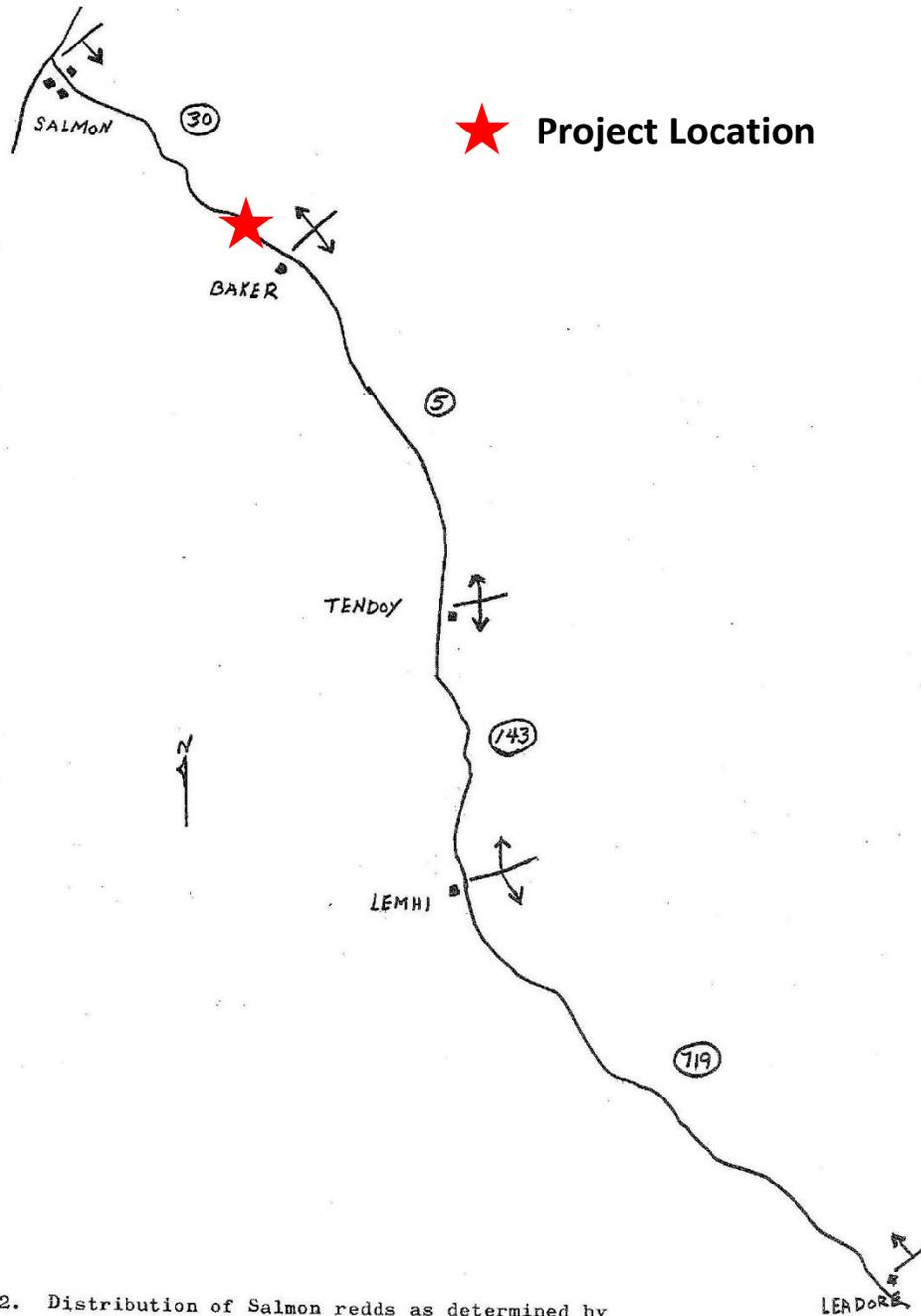


Figure 2. Distribution of Salmon redds as determined by aerial survey, Lemhi River, September 6, 1957.

History of Lemhi Development

Beaver Removal (Early 1800 – 1830's)

The first large-scale habitat alterations occurred in the early 1880s. In an effort to keep the expanding American presence from moving into their historic trapping territories, the Hudson's Bay Company deliberately attempted to create a biological desert, devoid of trappable beaver populations. **By 1830, John Work of the Company notes of the Lemhi in his field journal, "The men complain of a great scarcity of beaver considering the fine appearance of the river for them, and the numbers which were formerly found in it (Haines 1971)." The extirpation of the beaver population undoubtedly completely changed the hydrologic characteristics of the river and its tributaries. Loucks (2001)**



Historical Perspective Lemhi Channelization



Railroad was removed in 1939, and transferred to the State of Idaho 1952. The highway engineers preferred to “move the river” rather than construct the many bridges required.



Historical Perspective

Lemhi Channelization

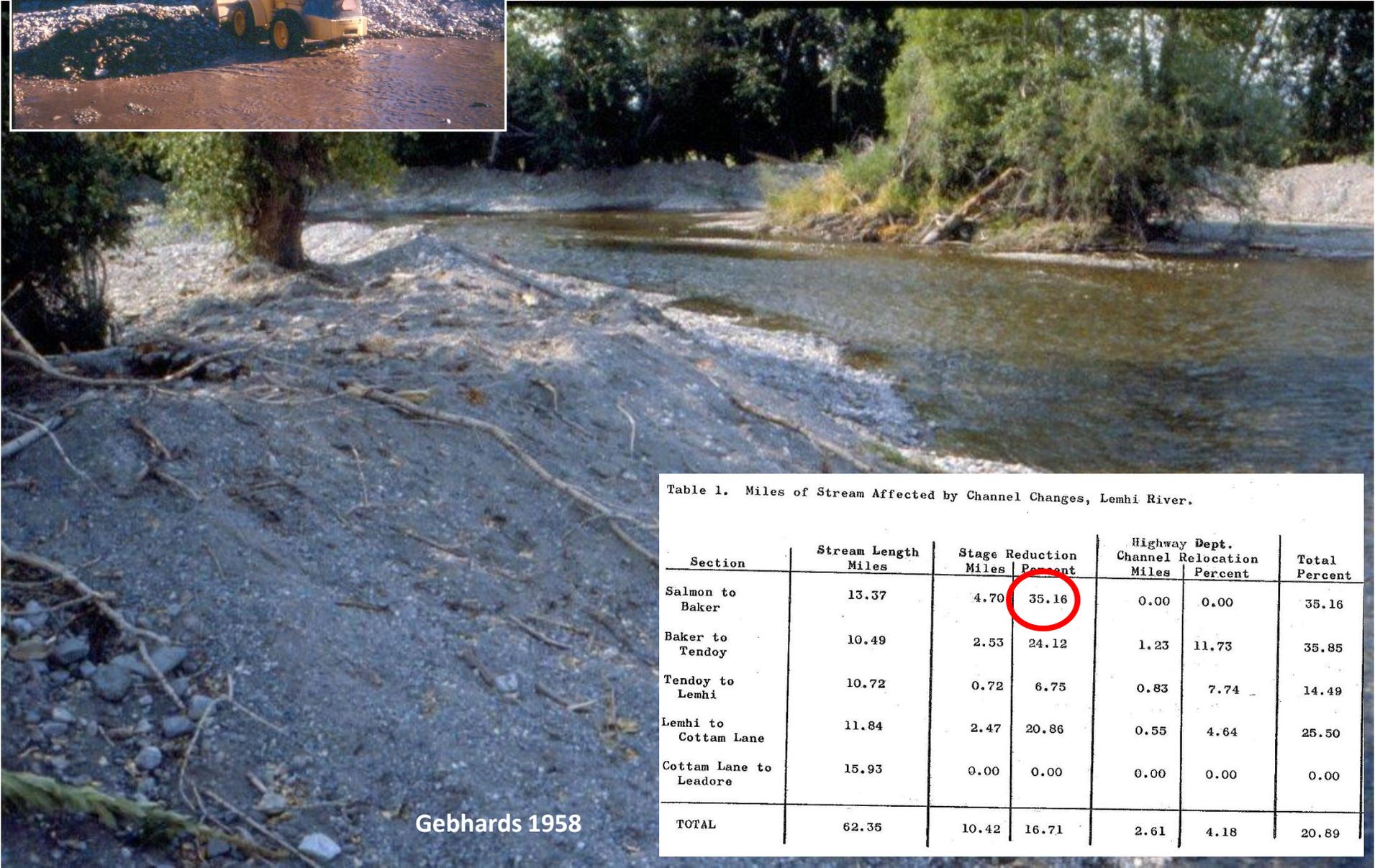


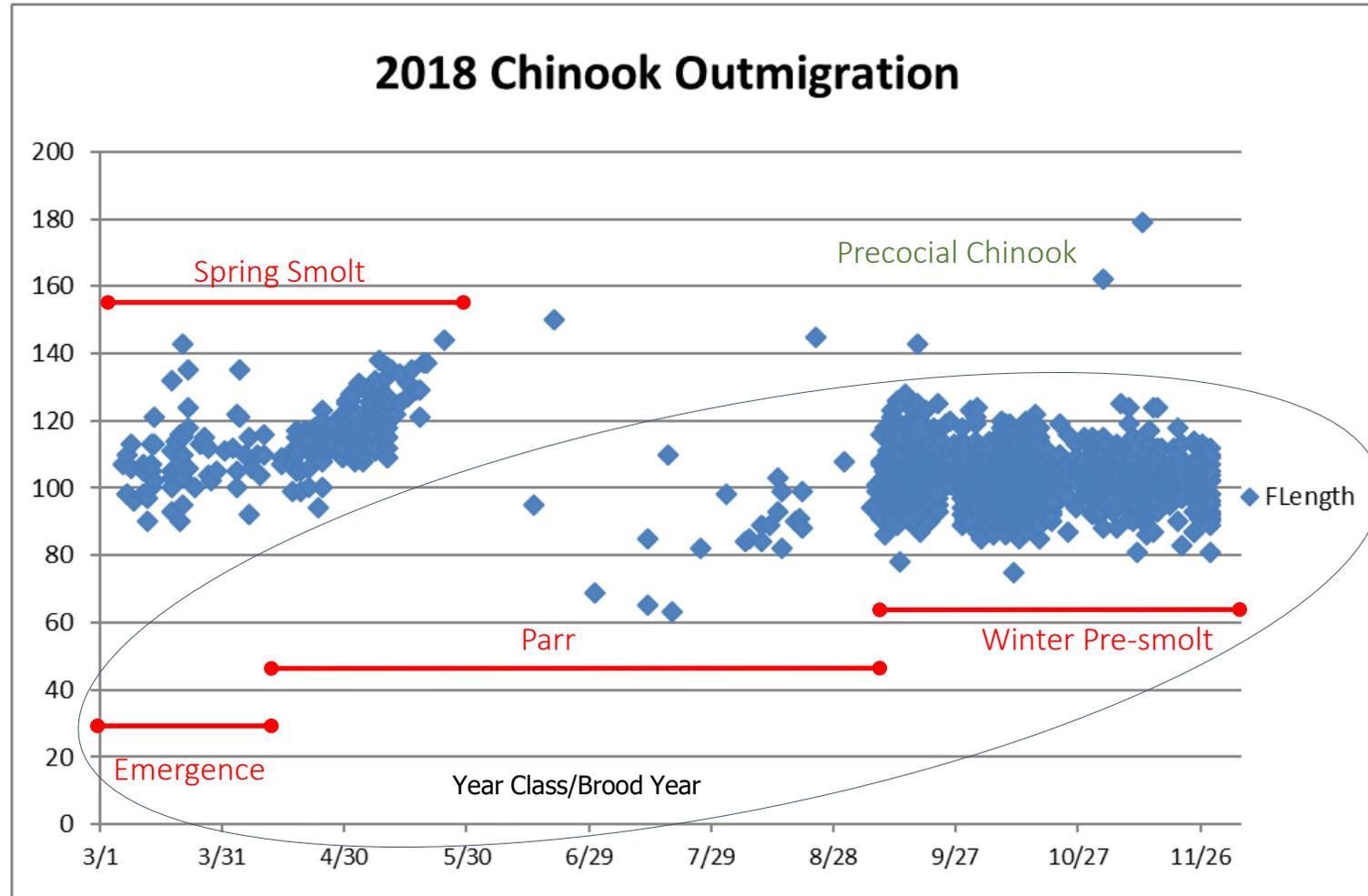
Table 1. Miles of Stream Affected by Channel Changes, Lemhi River.

Section	Stream Length Miles	Stage Reduction		Highway Dept. Channel Relocation		Total Percent
		Miles	Percent	Miles	Percent	
Salmon to Baker	13.37	4.70	35.16	0.00	0.00	35.16
Baker to Tendoy	10.49	2.53	24.12	1.23	11.73	35.85
Tendoy to Lemhi	10.72	0.72	6.75	0.83	7.74	14.49
Lemhi to Cottam Lane	11.84	2.47	20.86	0.55	4.64	25.50
Cottam Lane to Leadore	15.93	0.00	0.00	0.00	0.00	0.00
TOTAL	62.35	10.42	16.71	2.61	4.18	20.89

Gebhards 1958

Lemhi Juvenile Chinook Life Stages

(Based on Migration Timing)



Floodplain Benefits

Provide Important Habitat for Freshwater Life Stages

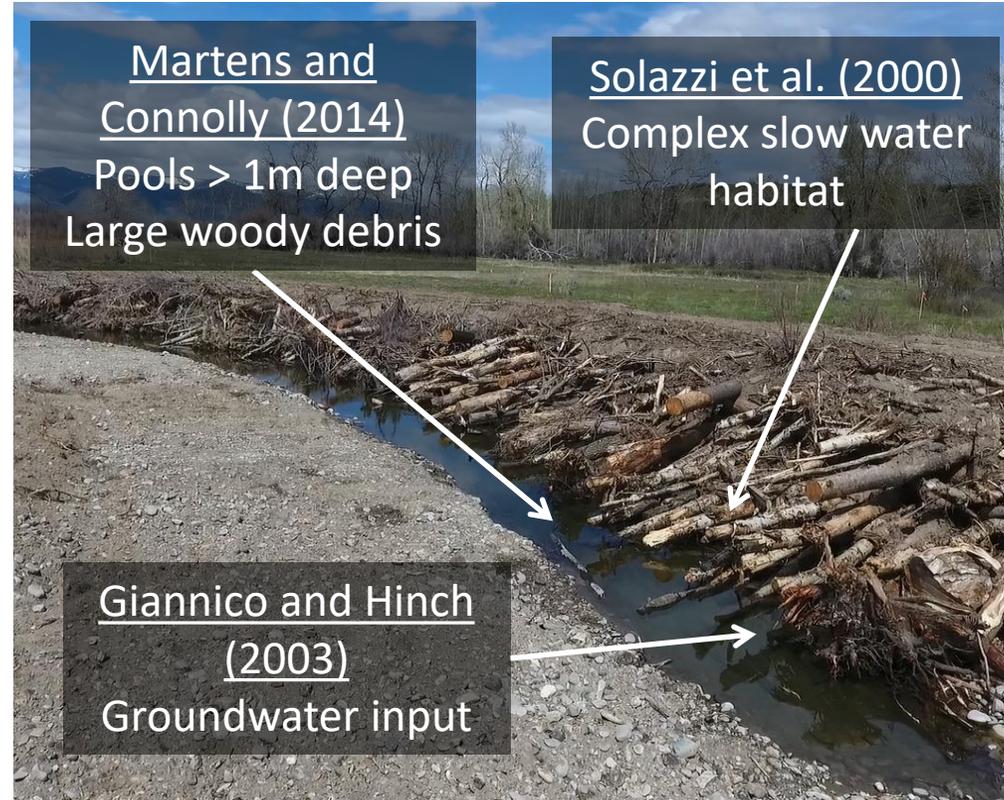
Summer Parr



- Diverse Micro Habitats
- Optimal Growth Conditions
- Low Water Velocities + Cover
- Lots of Food

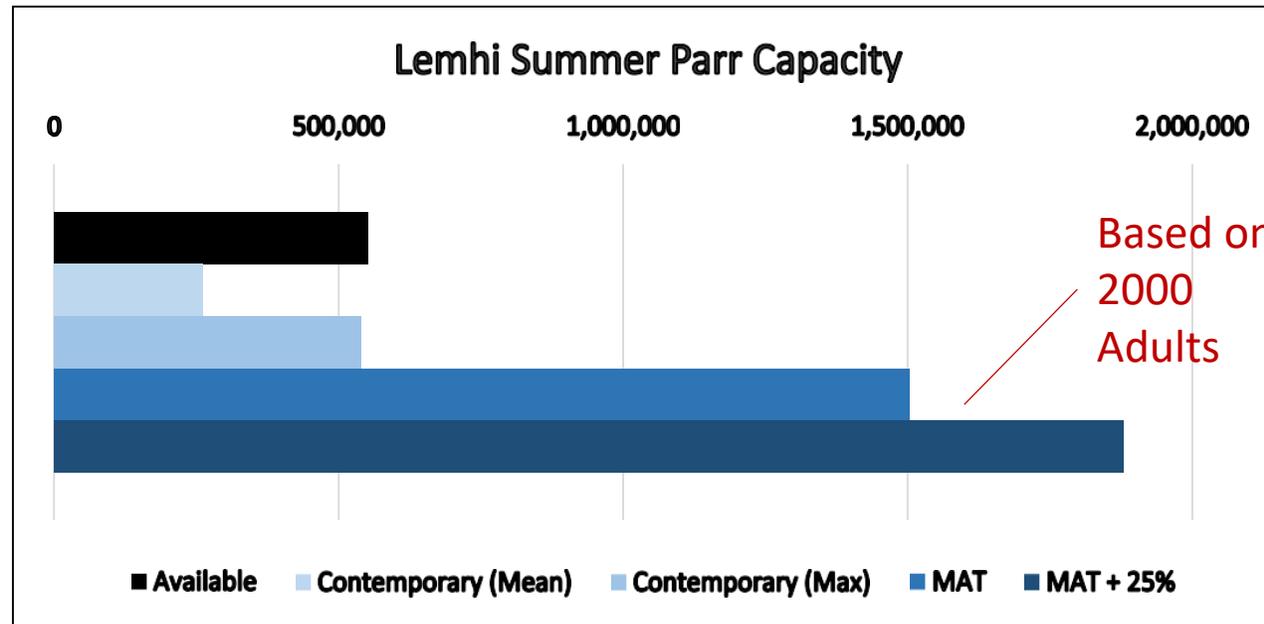
Beechie et al. 1994, Isaak and Thurow 2006,
Ebersol et al. 2003

Wintering Pre-smolts



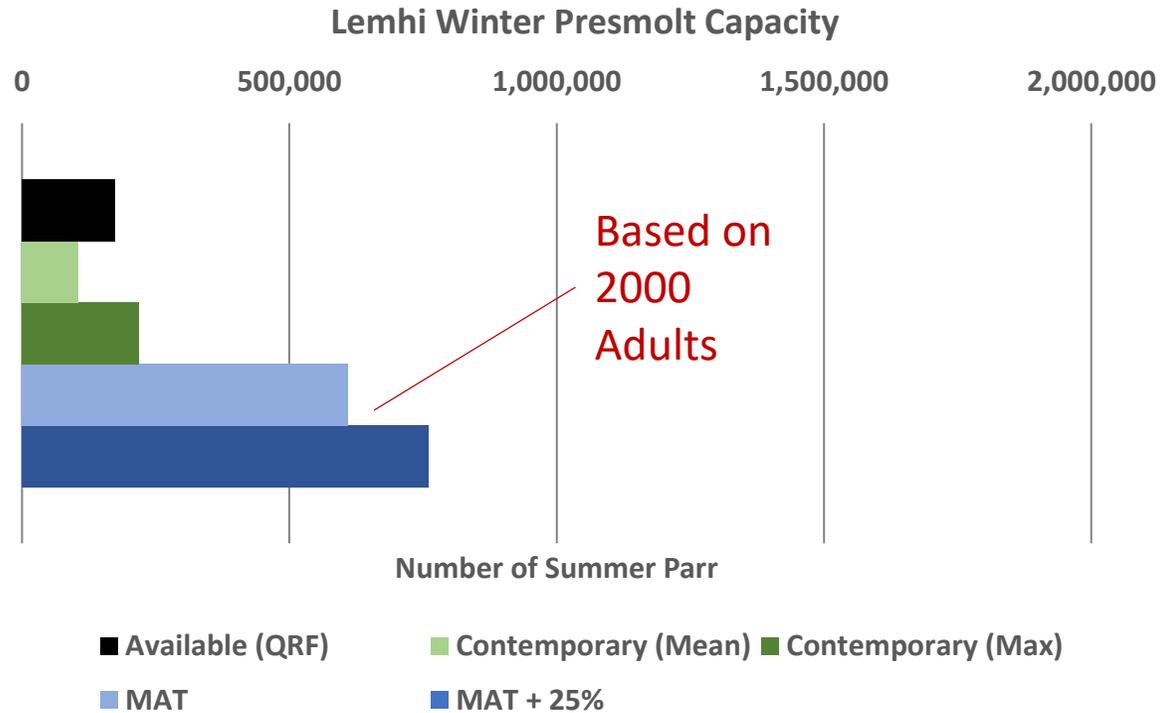
- SLOW water
- Complex
- Groundwater

Life Stage Specific Capacity – Lemhi Summer Parr



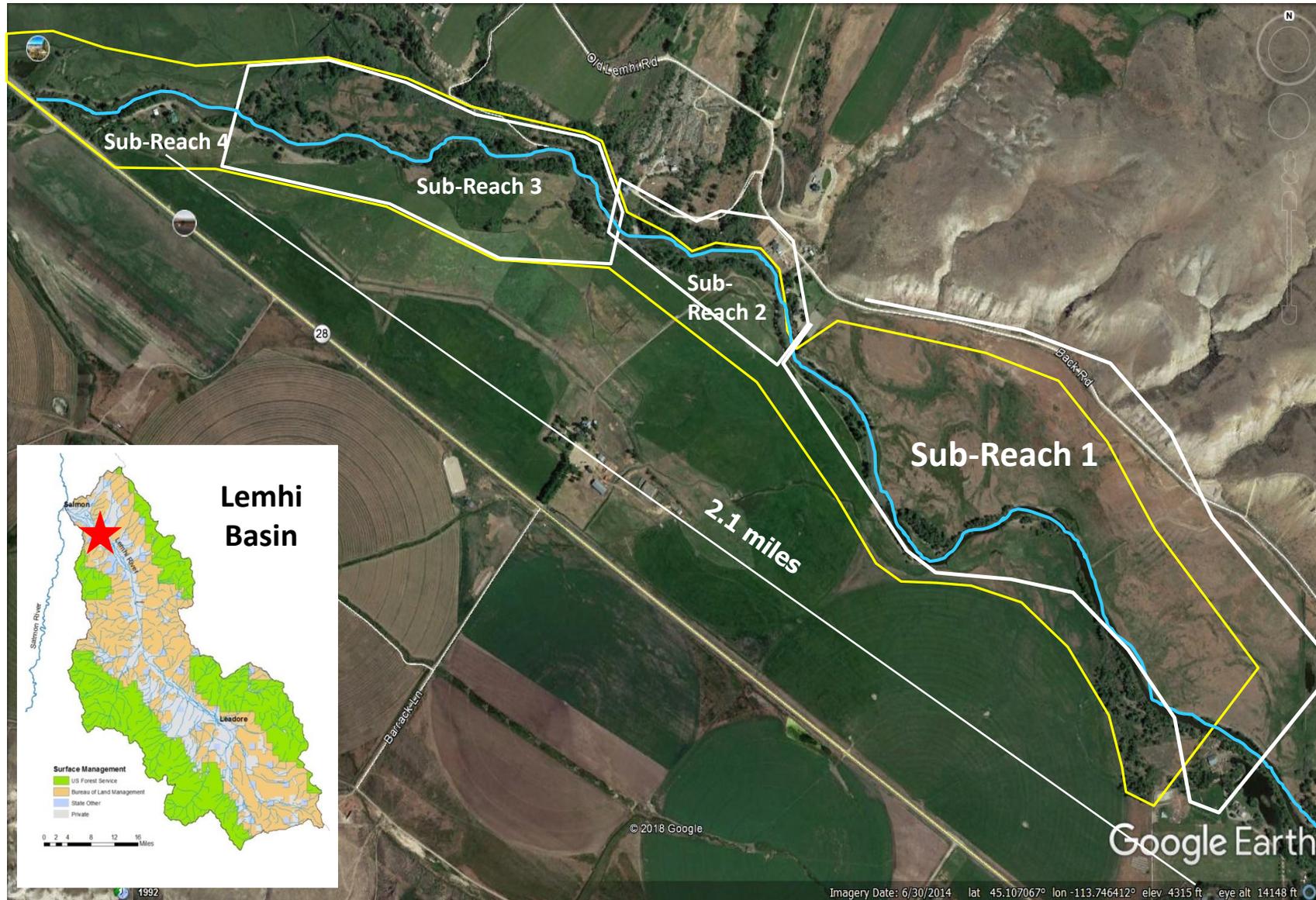
Life Stage Specific Capacity – Lemhi

Winter Presmolt



Projects to Increase Habitat Capacity

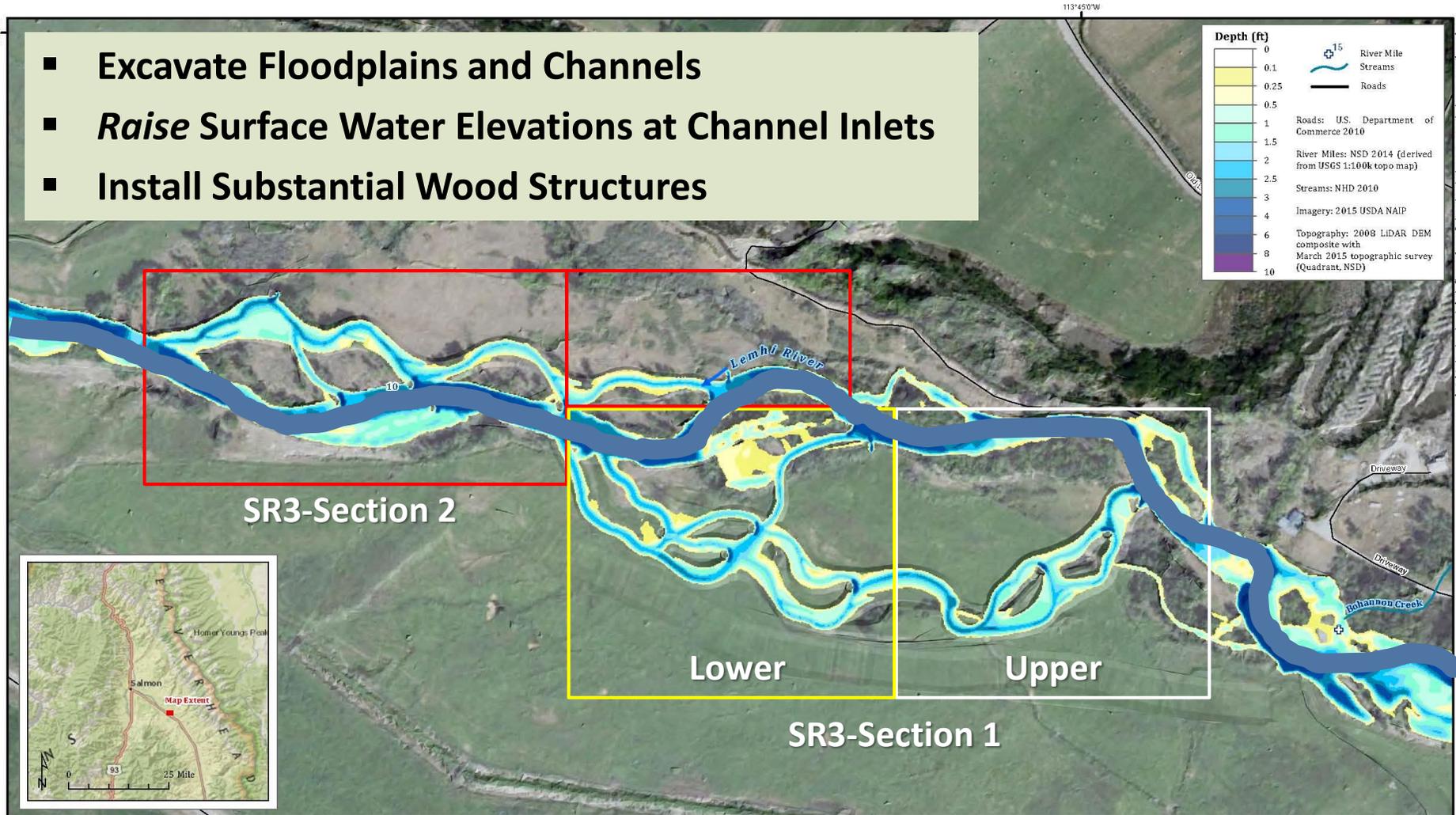
Floodplain Rehabilitation- Lower Lemhi River Project Reach



Project Updates

Sub-Reach 3

- Excavate Floodplains and Channels
- *Raise* Surface Water Elevations at Channel Inlets
- Install Substantial Wood Structures



Lemhi River Eagle Valley Ranch Restoration
Proposed Conditions Model Output - 2-year Flow Depth (1,100 cfs)

RiverFlow-2D Plus GPU Hydraulic Model Output



0 250 500 750 1,000 Feet

Lambert conformal conic projection, NAD 1983
 State Plane Coordinate System (Idaho Central Zone)



SR3 – Section 1 Pre Construction



SR3 – Section 1 Construction



SR3 Construction



Ongoing

Spring
2018

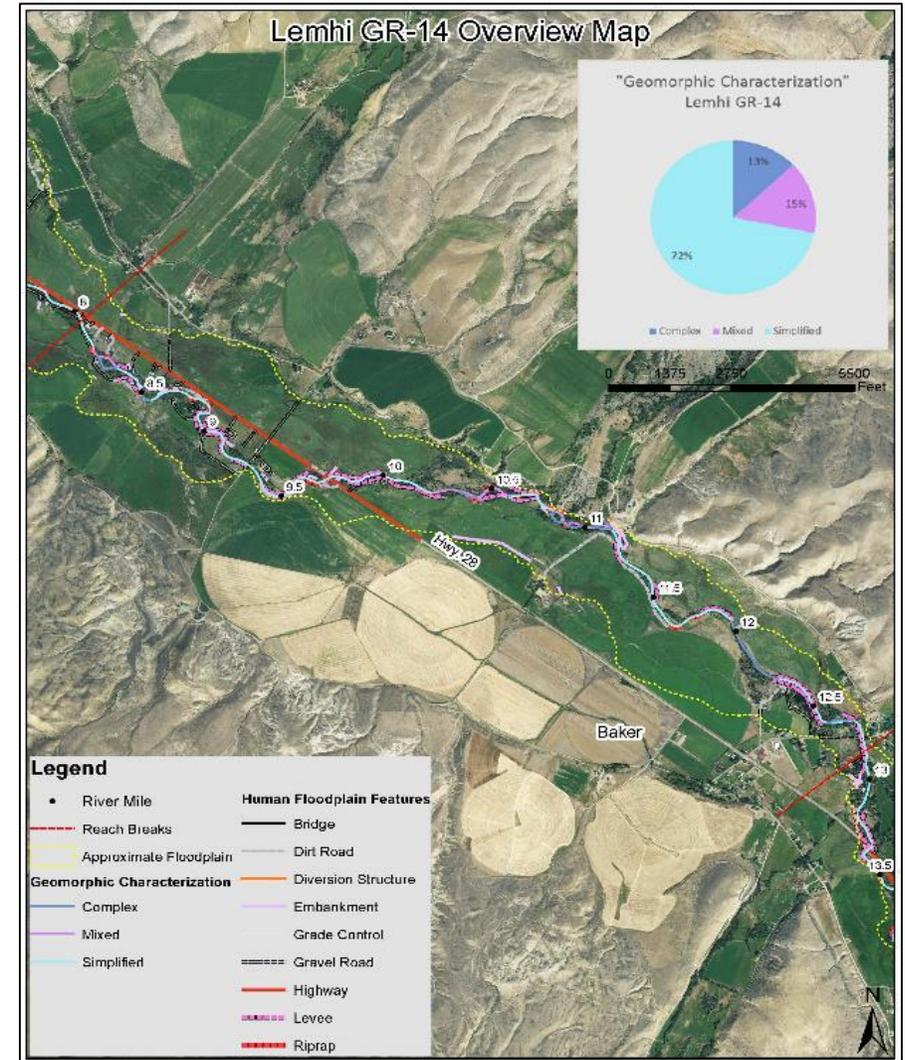
Fall
2018

Fall
2018

Geomorphic Condition

Lemhi Geomorphic Reach 14

- Channel straightening, simplification (levees, riprap, diversions, etc.)
 - Bed armoring
 - Channel Incision
 - Loss of off-channel habitat
 - Plane-bed morphology
- Loss of riparian vegetation
 - Increased rates of migration
 - Bank instability (over widening)
 - Loss of in channel structure
 - Plane-bed morphology



Channel Simplification



Loss of Riparian Habitat: 1992



Loss of Riparian Habitat: 1998



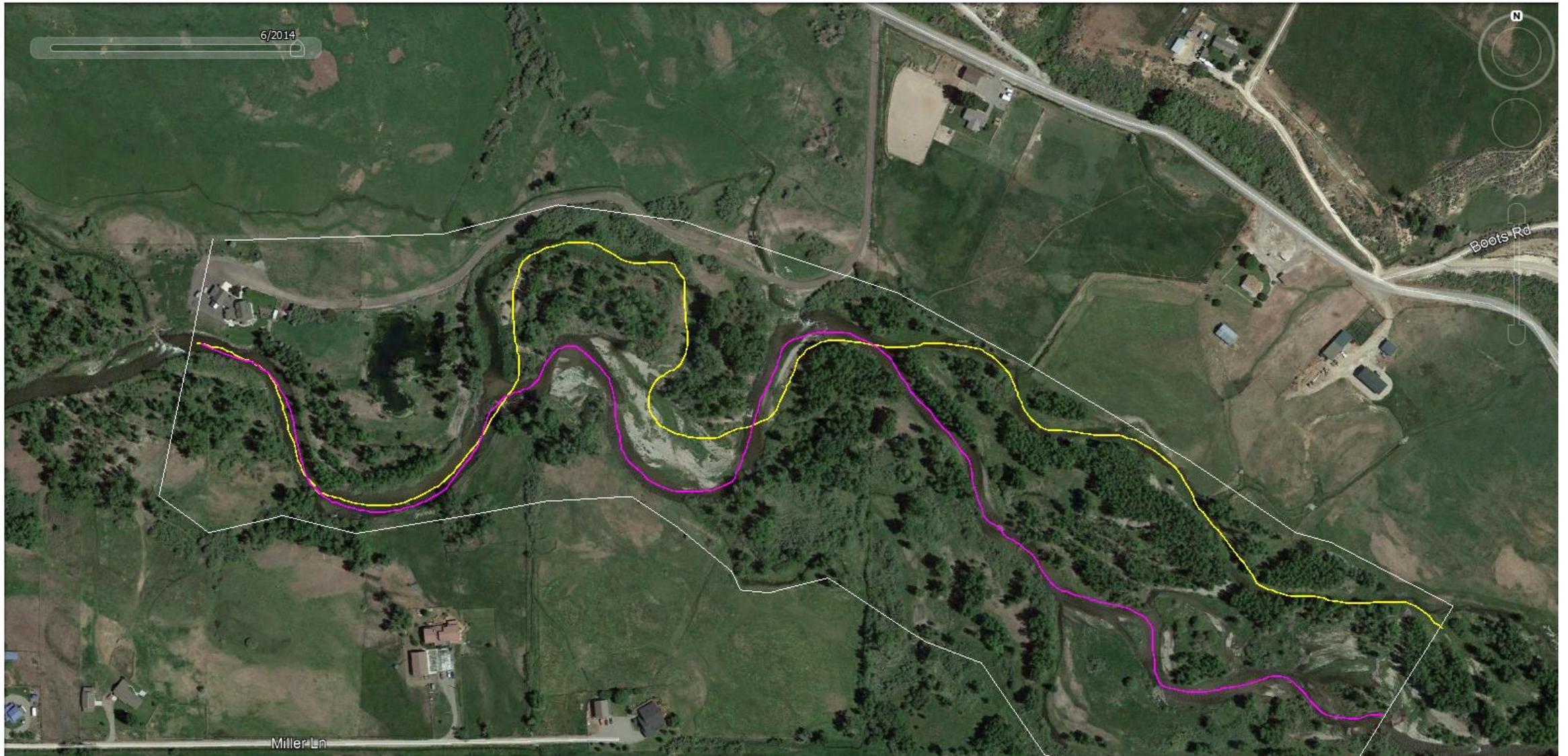
Loss of Riparian Habitat: 2014



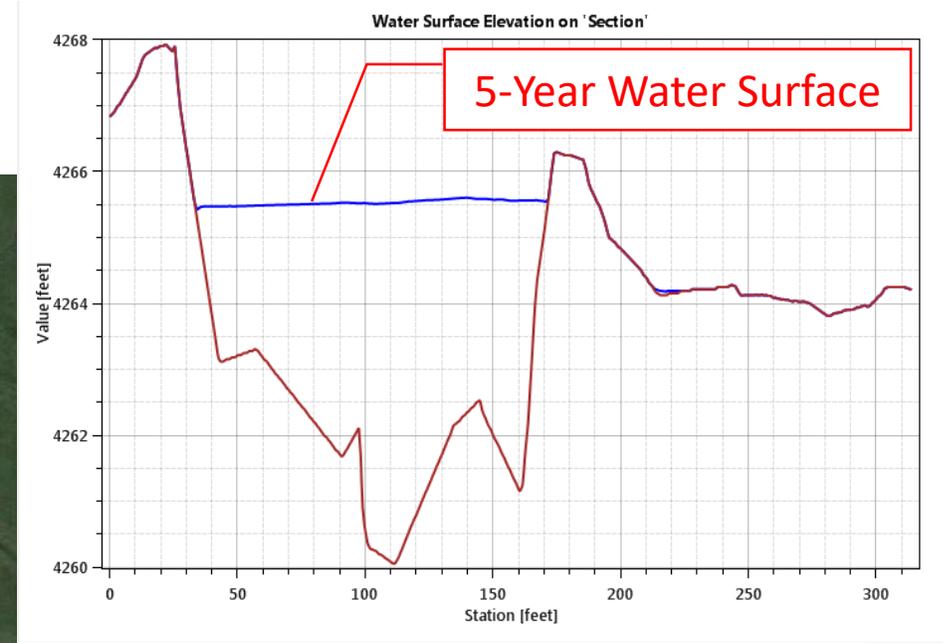
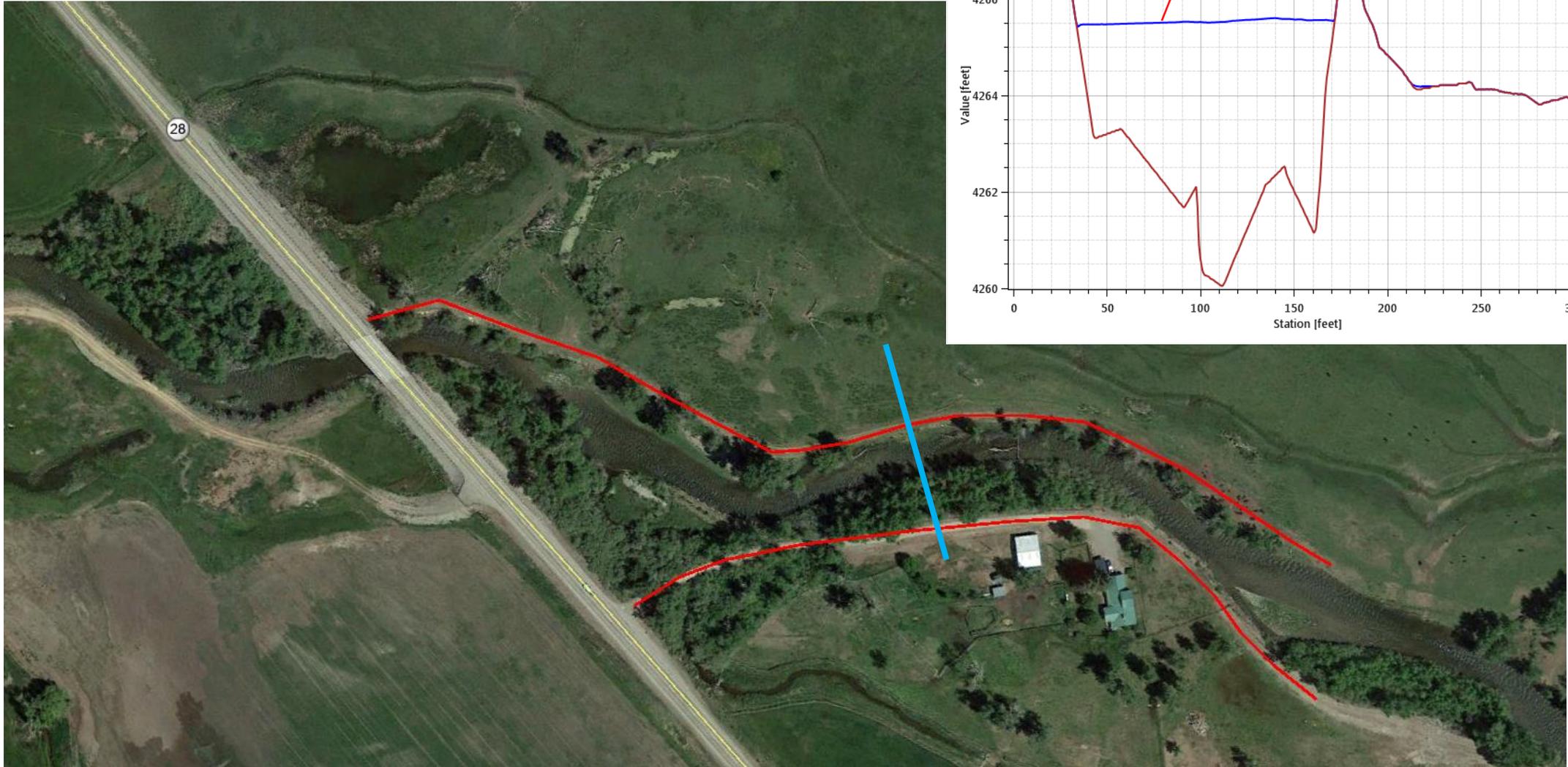
Rivers Need Space and Vegetation



Rivers Need Space and Vegetation



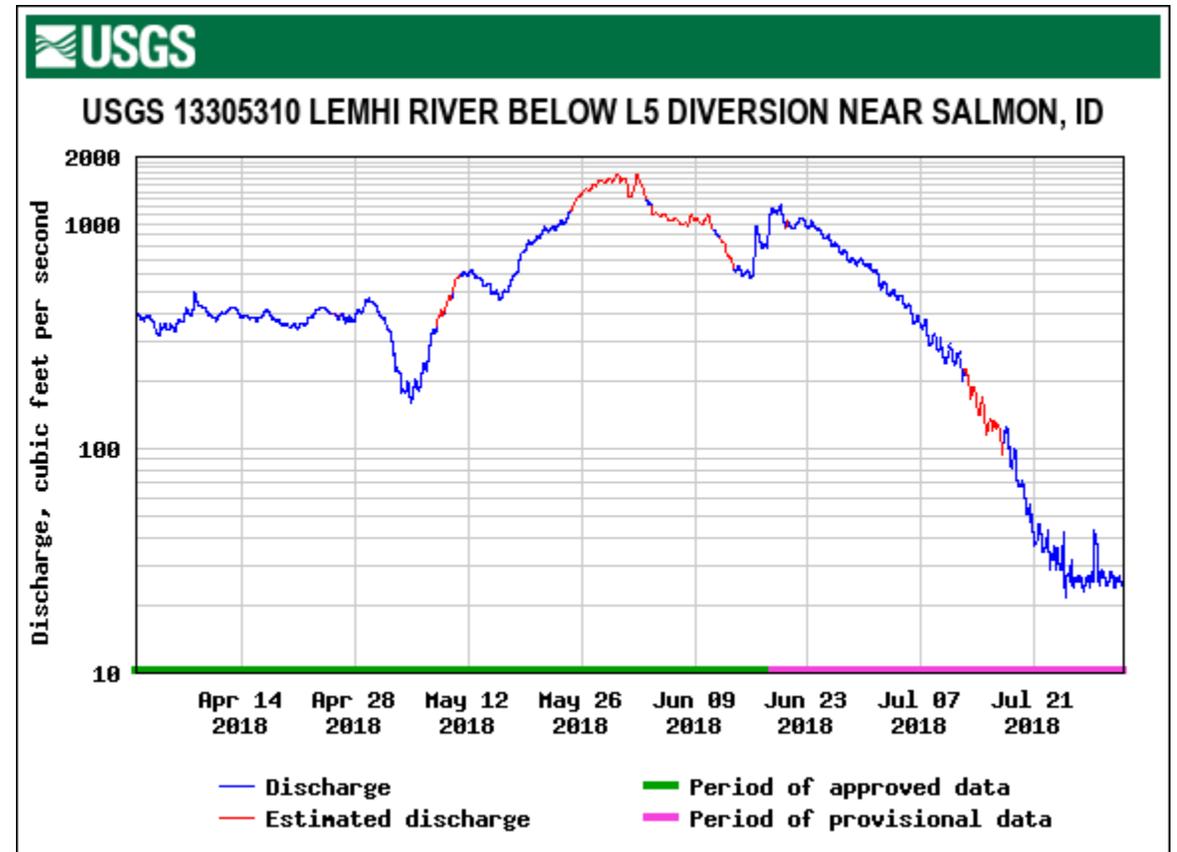
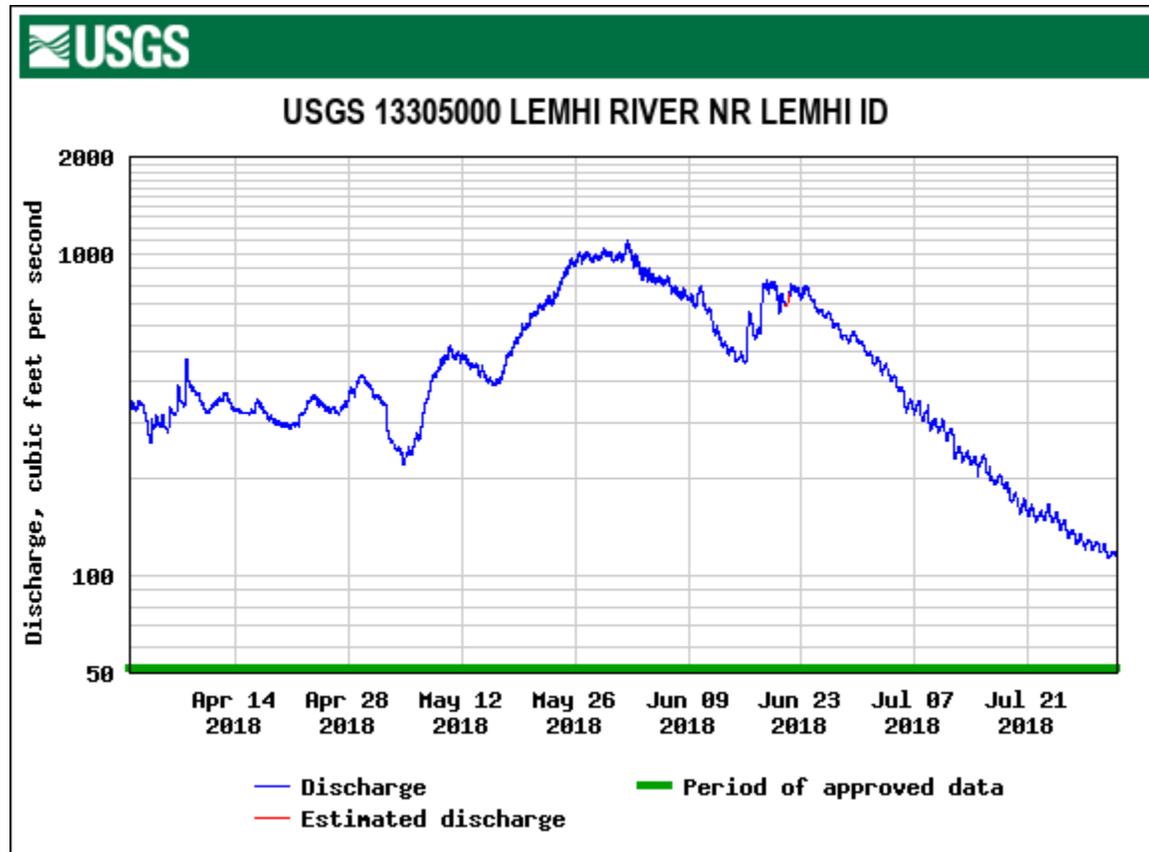
EVR SR-4 Channelized



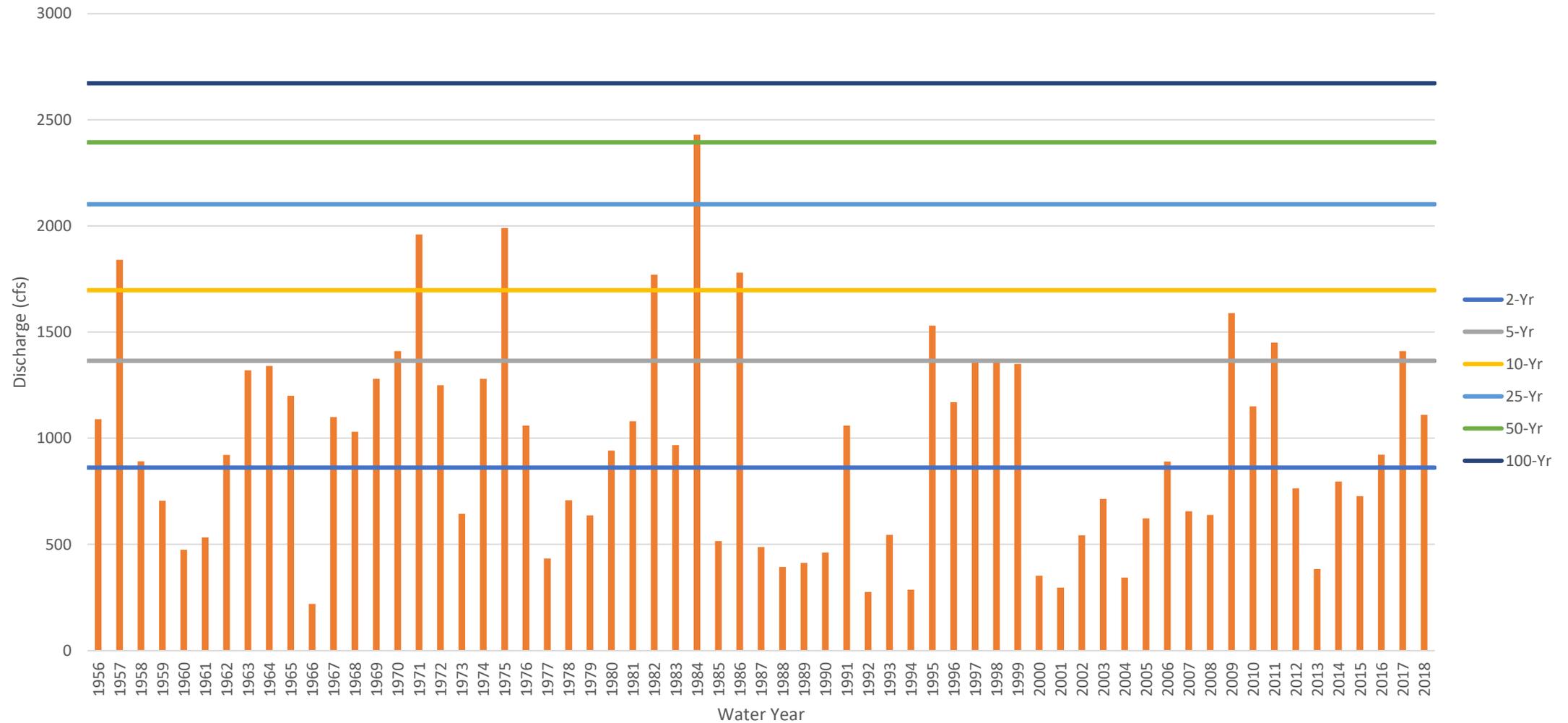
Lemhi 2018 Peak Runoff – May 31, 2018

13305000: \cong 1,050 cfs

13305310: \cong 1,600 cfs



Lemhi USGS Gage 13305000 Peak Flows





2017 Drone Imagery EVR SR-4

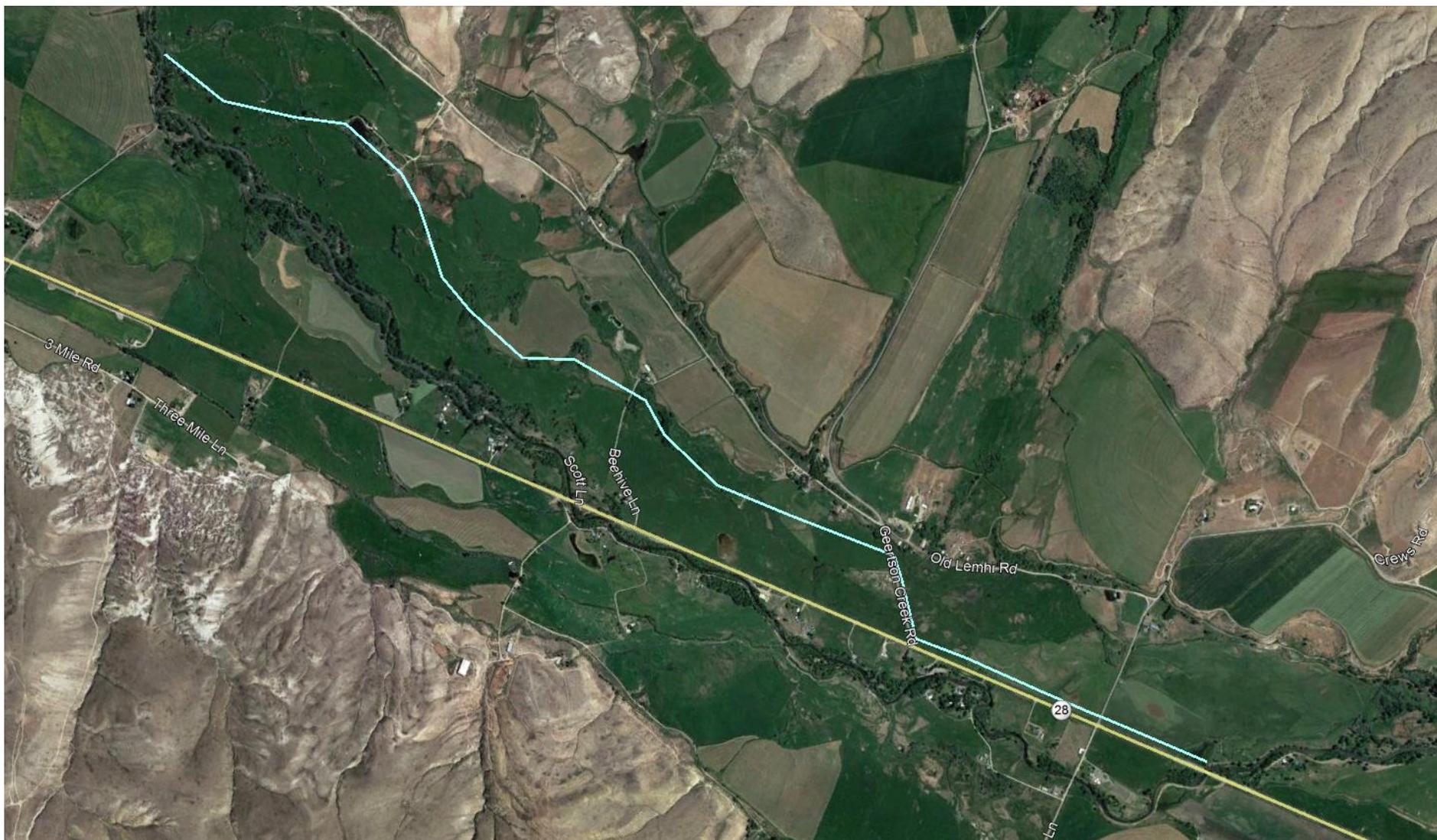


2018 Drone Imagery EVR SR-4

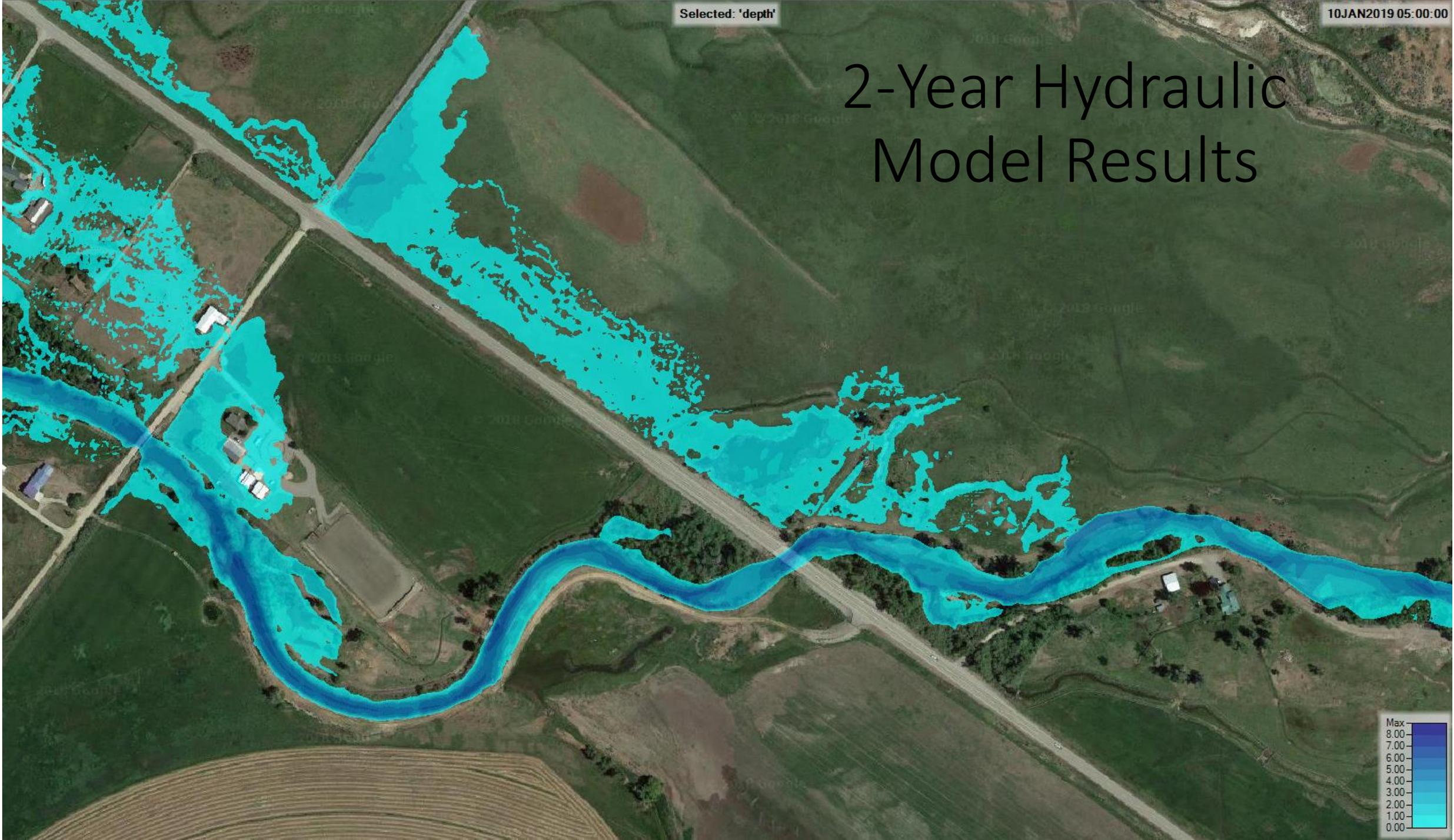
2018 Lemhi Flooding



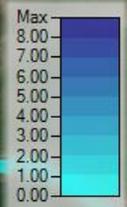
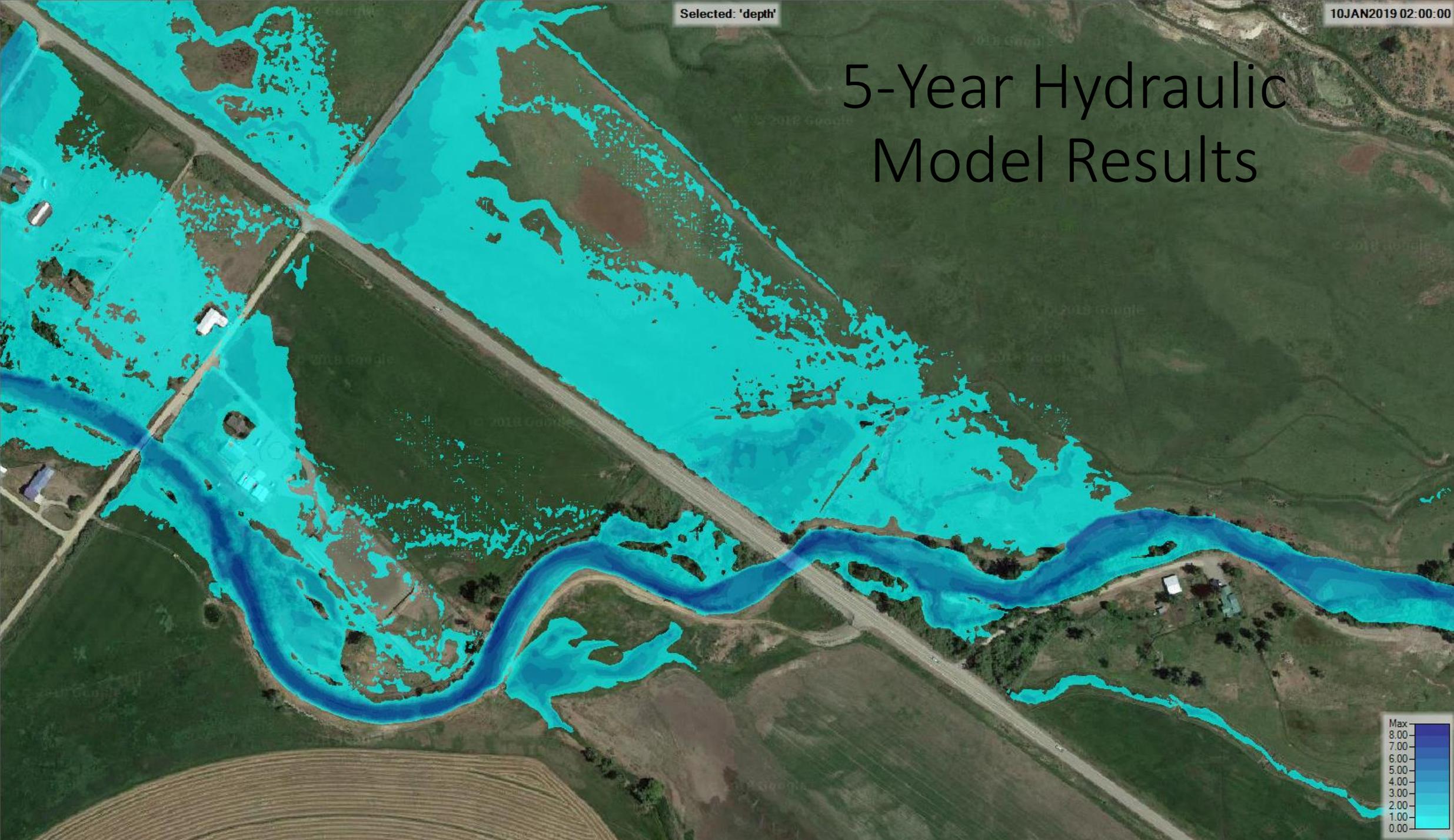
2018 Flood Flows Return 3.6 Miles Downstream



2-Year Hydraulic Model Results



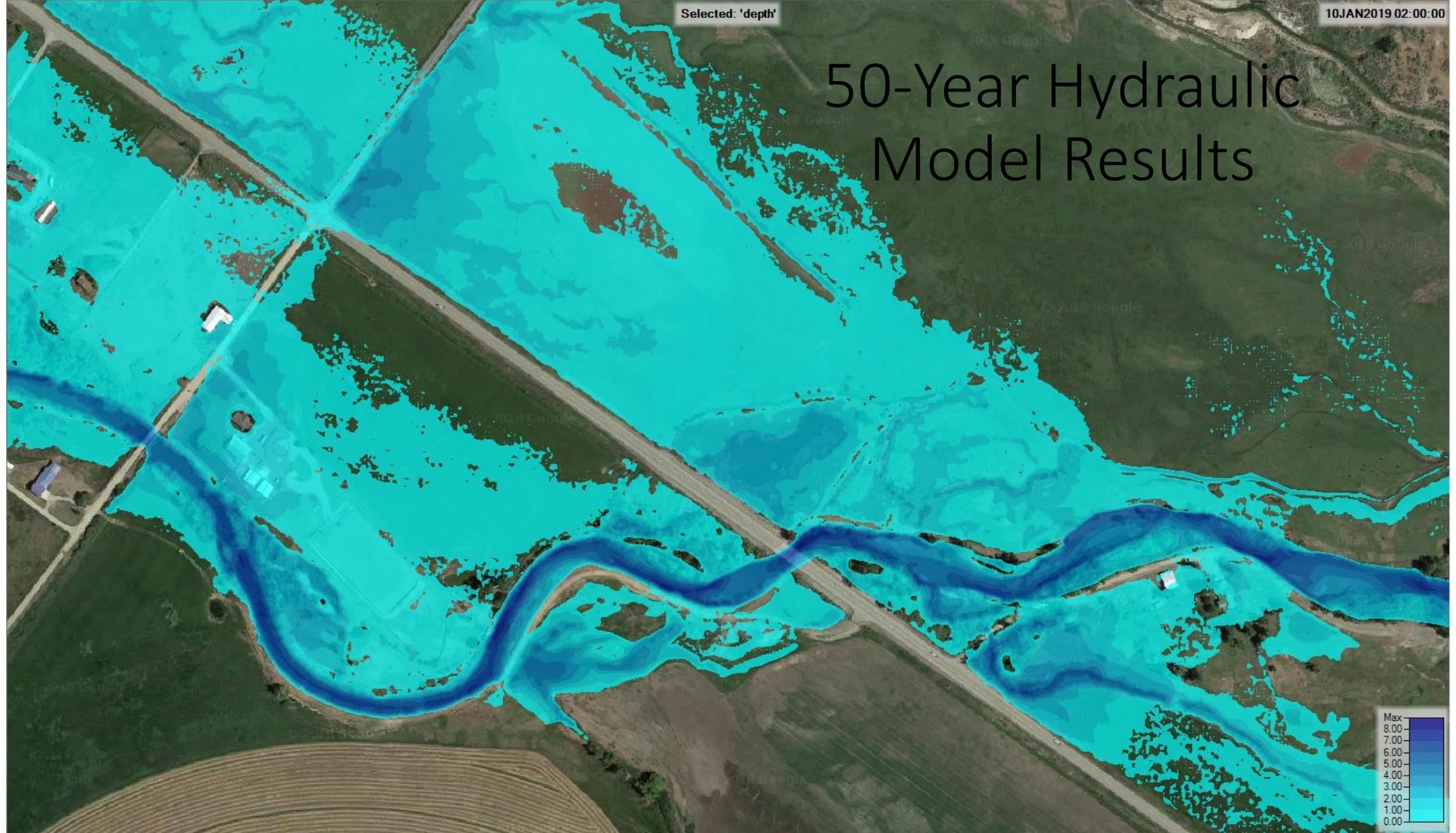
5-Year Hydraulic Model Results



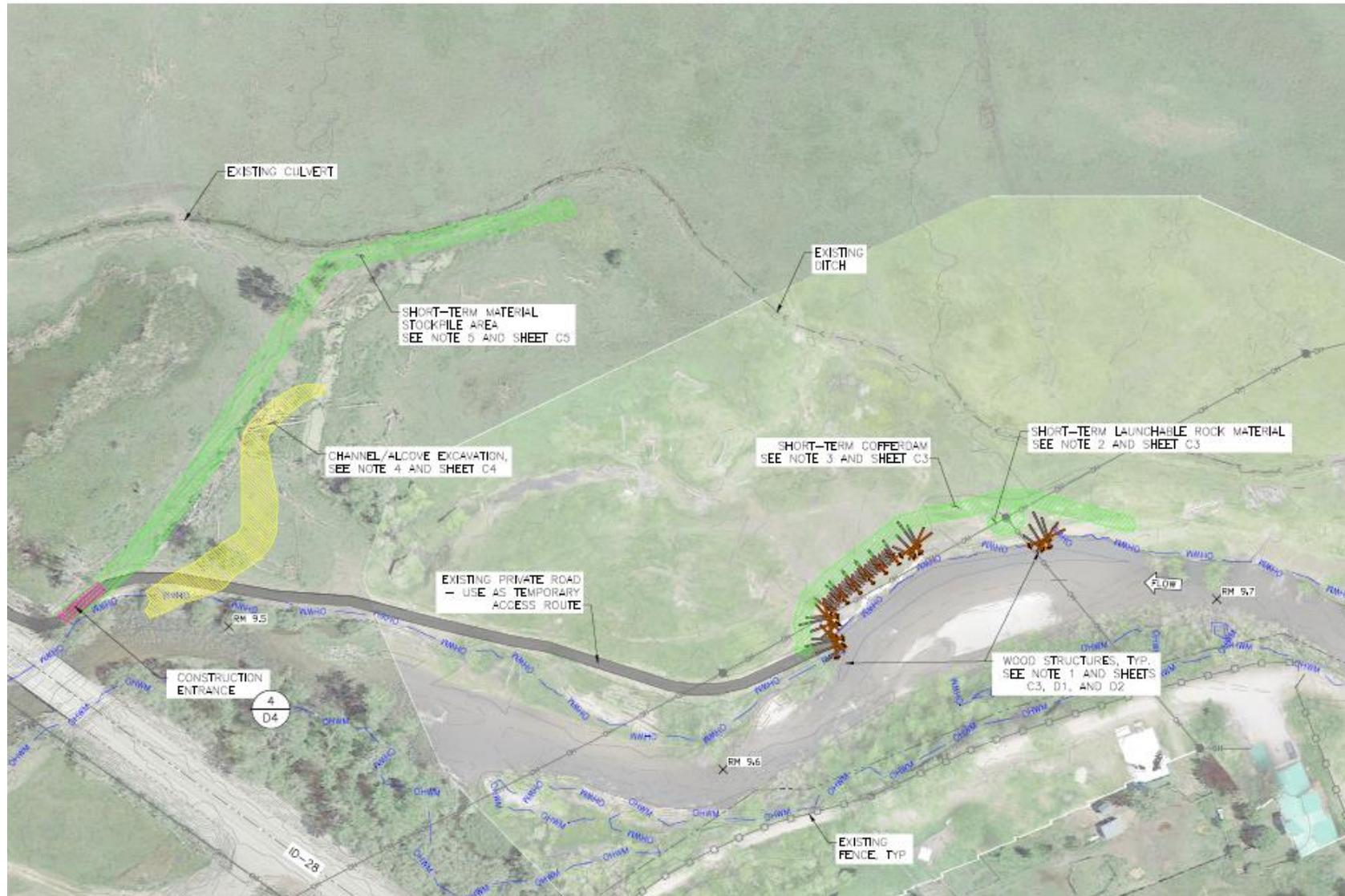
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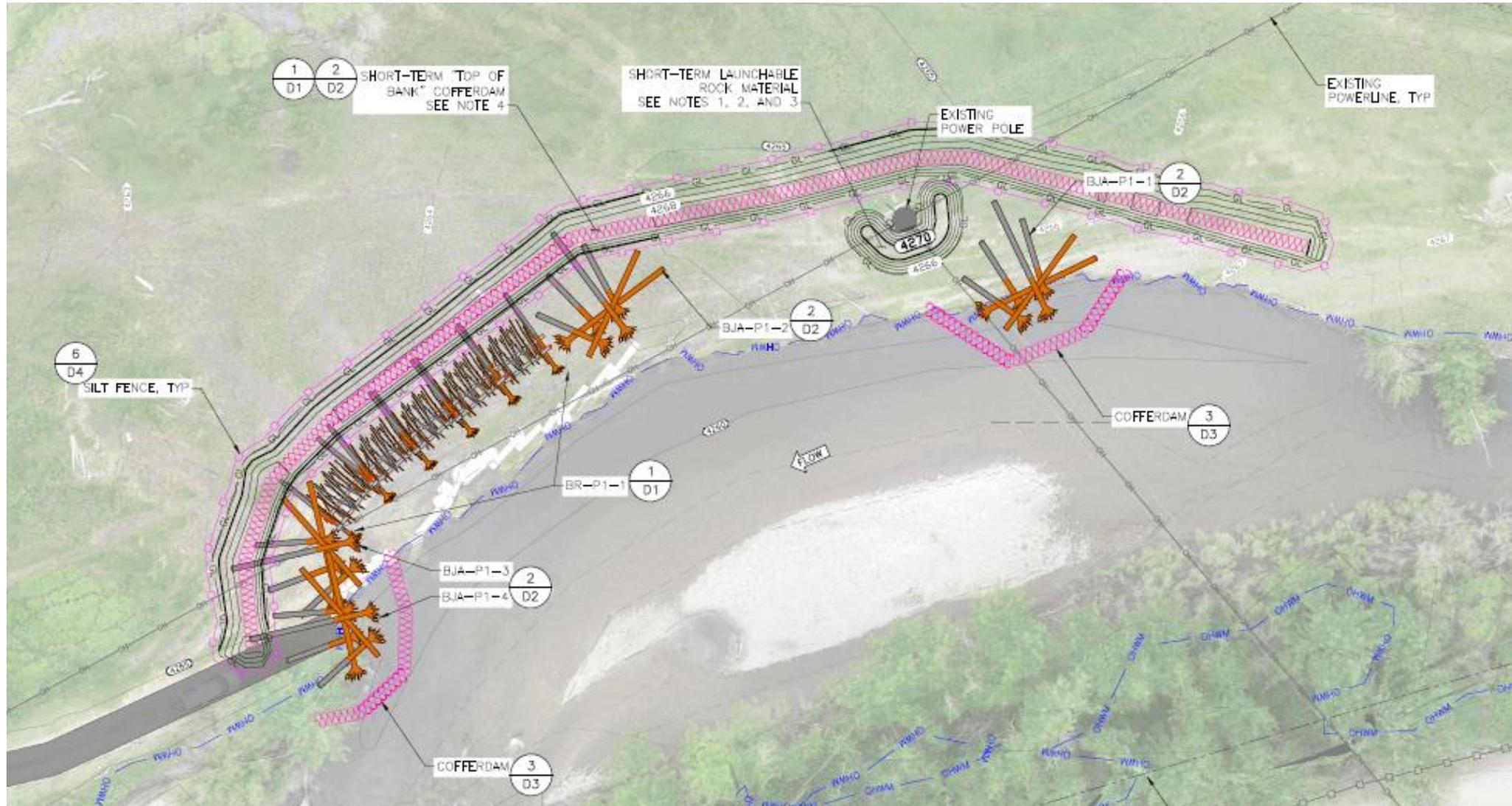
50-Year Hydraulic Model Results



EVR SR-4 Conceptual Design Phase 1



EVR SR-4 Conceptual Design Phase 1



EVR SR-4 Design Goals and Objectives

- Floodplain Connection

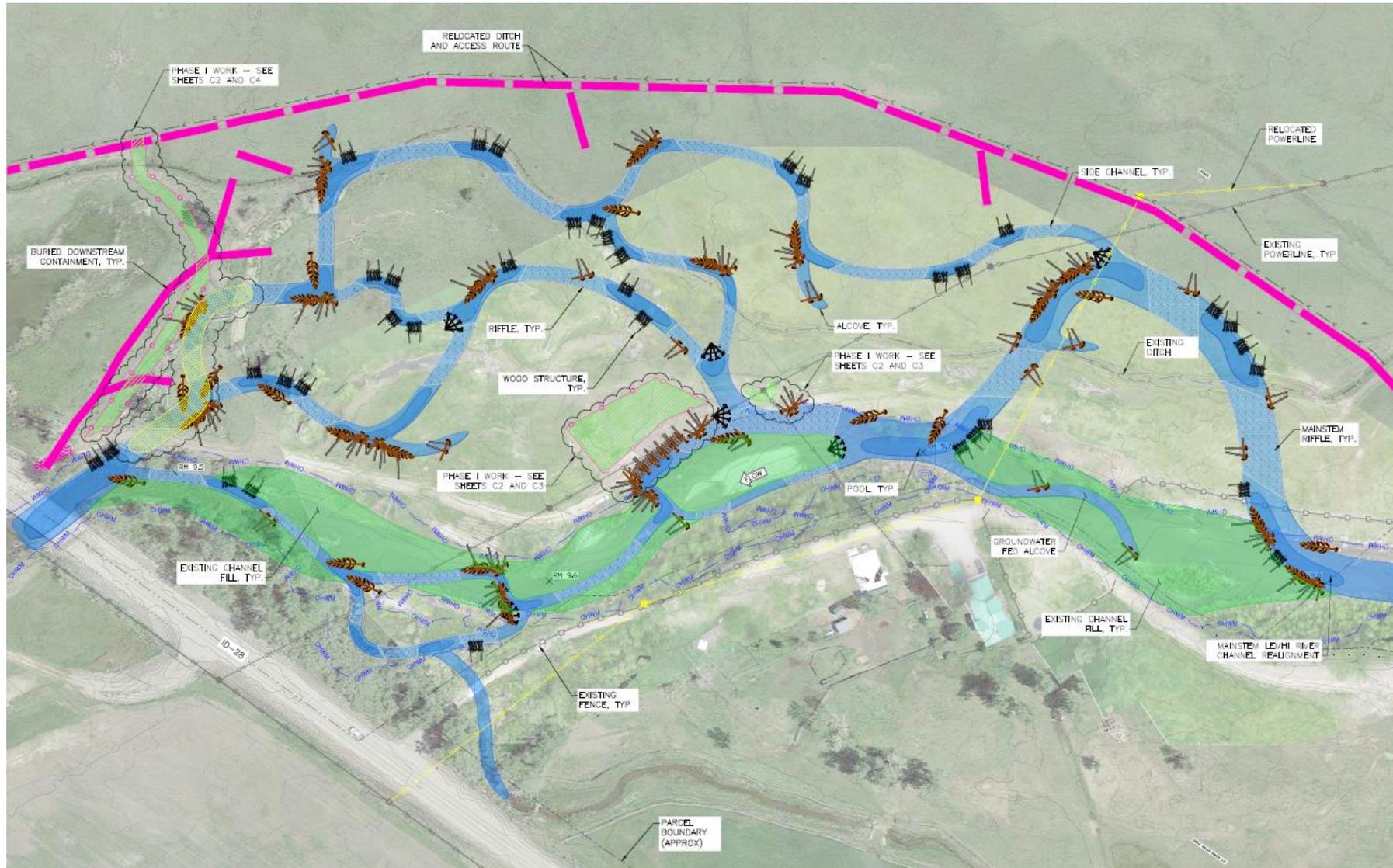
- Deposition of sediment (localized in channel/ floodplain)
- Creation of off-channel habitat
- Re-establishment of Riparian Corridor
- No negative downstream effects
- Shading of channel

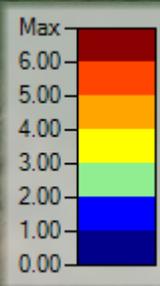
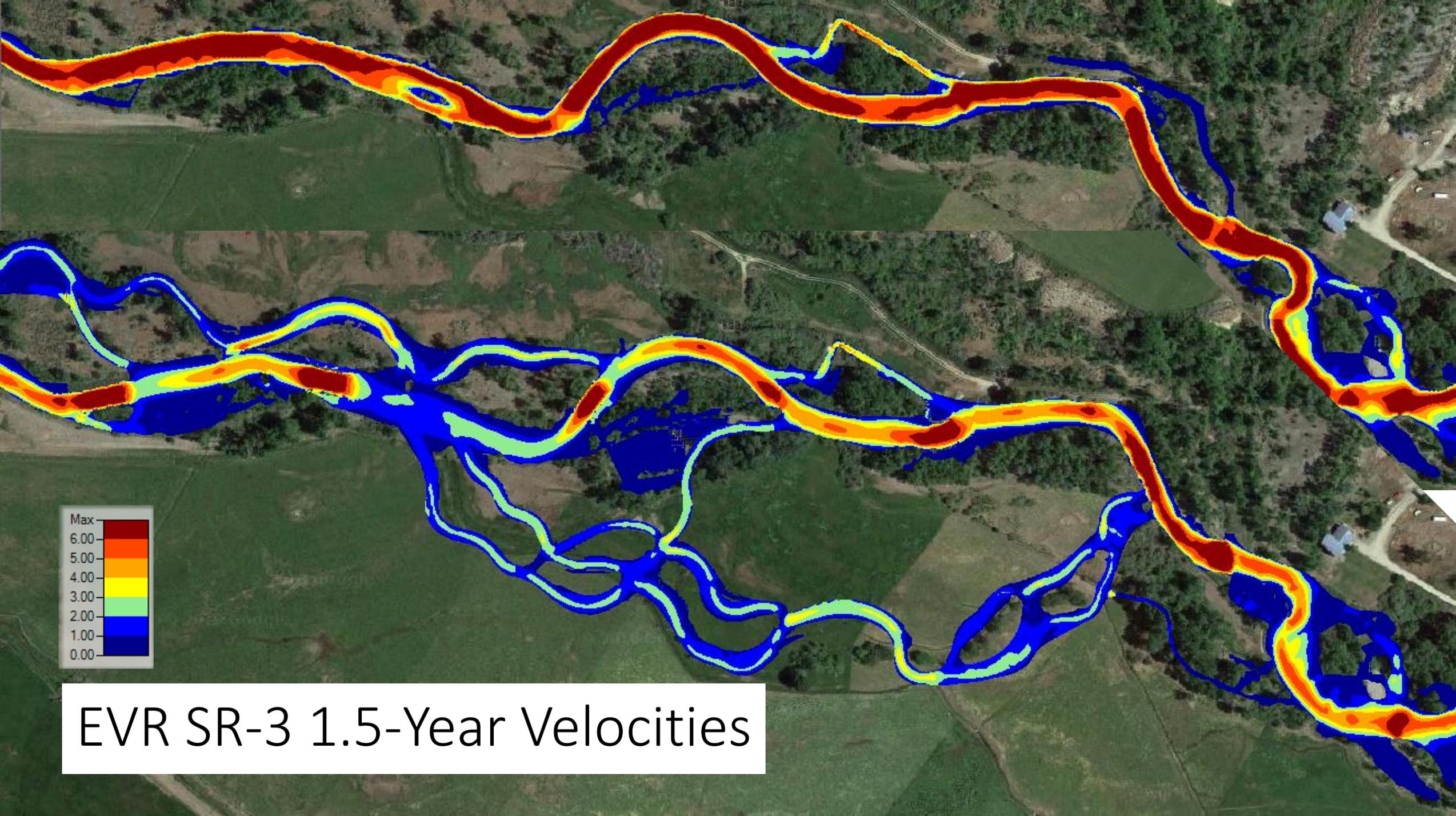
- Geomorphically Appropriate Channel

- Channel narrowing
- Reduced rates of channel migration (lateral instead of downstream)
- Overall increase in hydraulic/ habitat diversity
- Pool and riffle formation

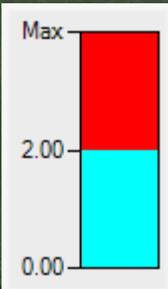
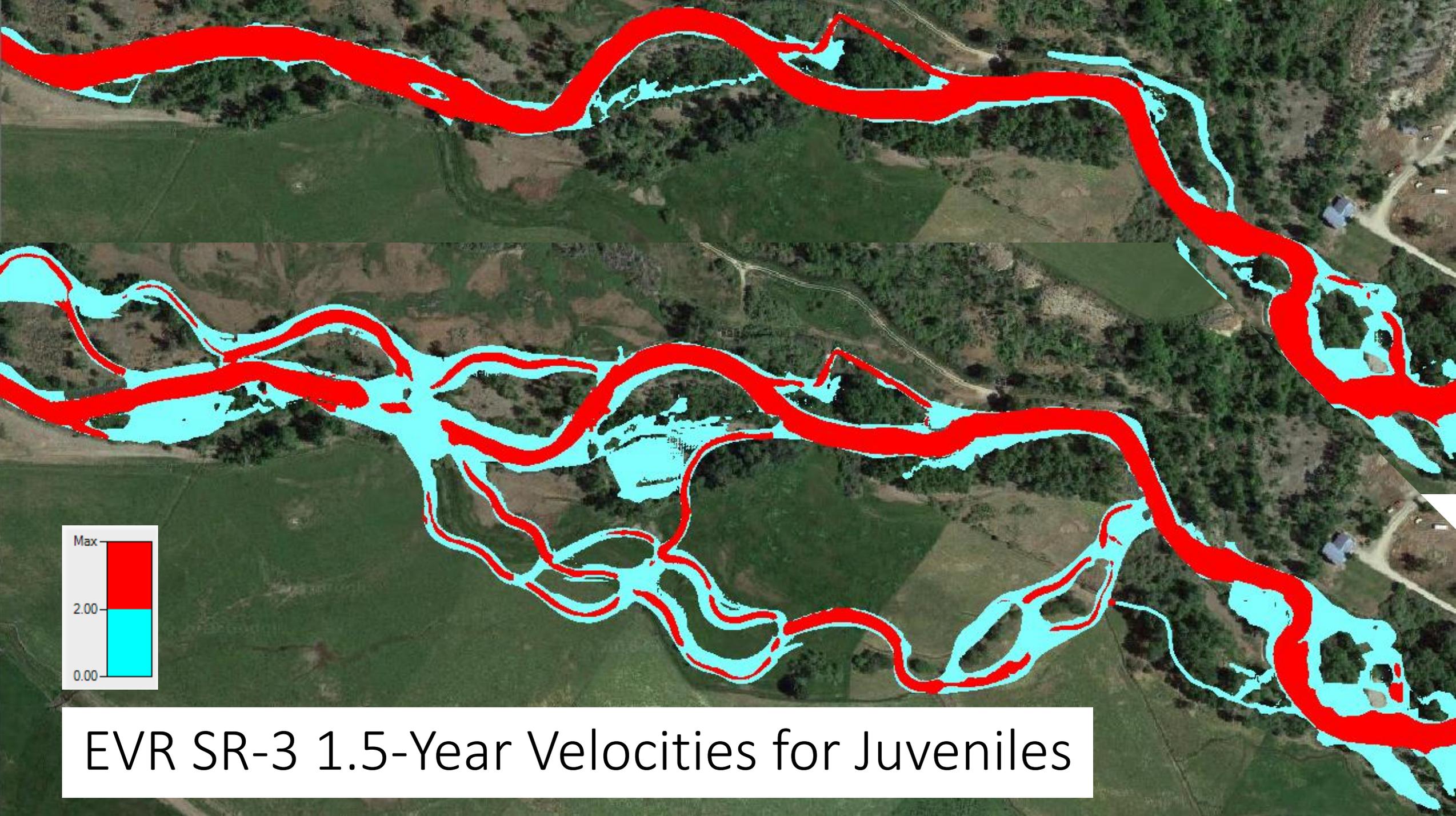


EVR SR-4 Conceptual Design

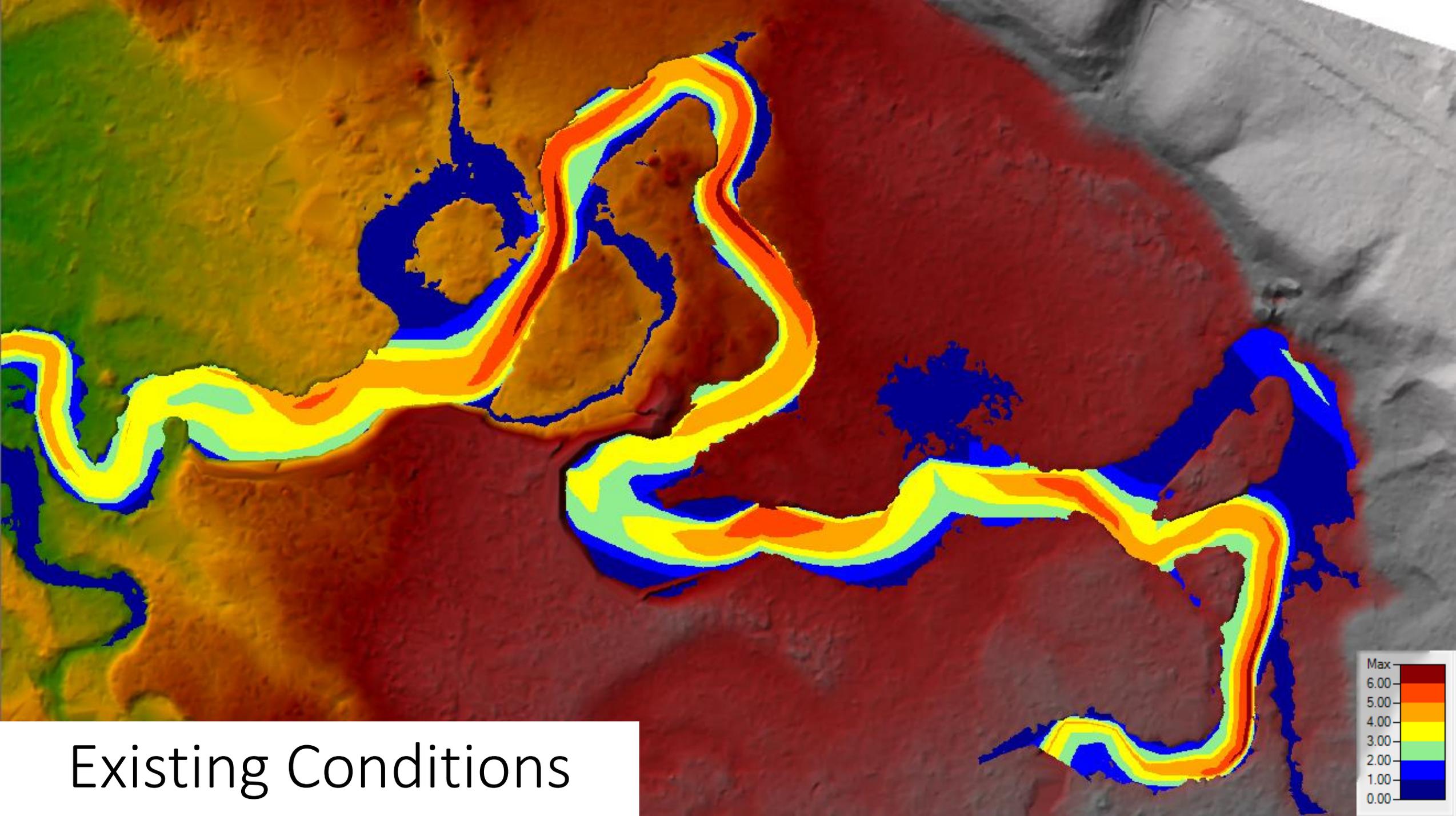




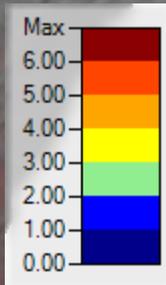
EVR SR-3 1.5-Year Velocities

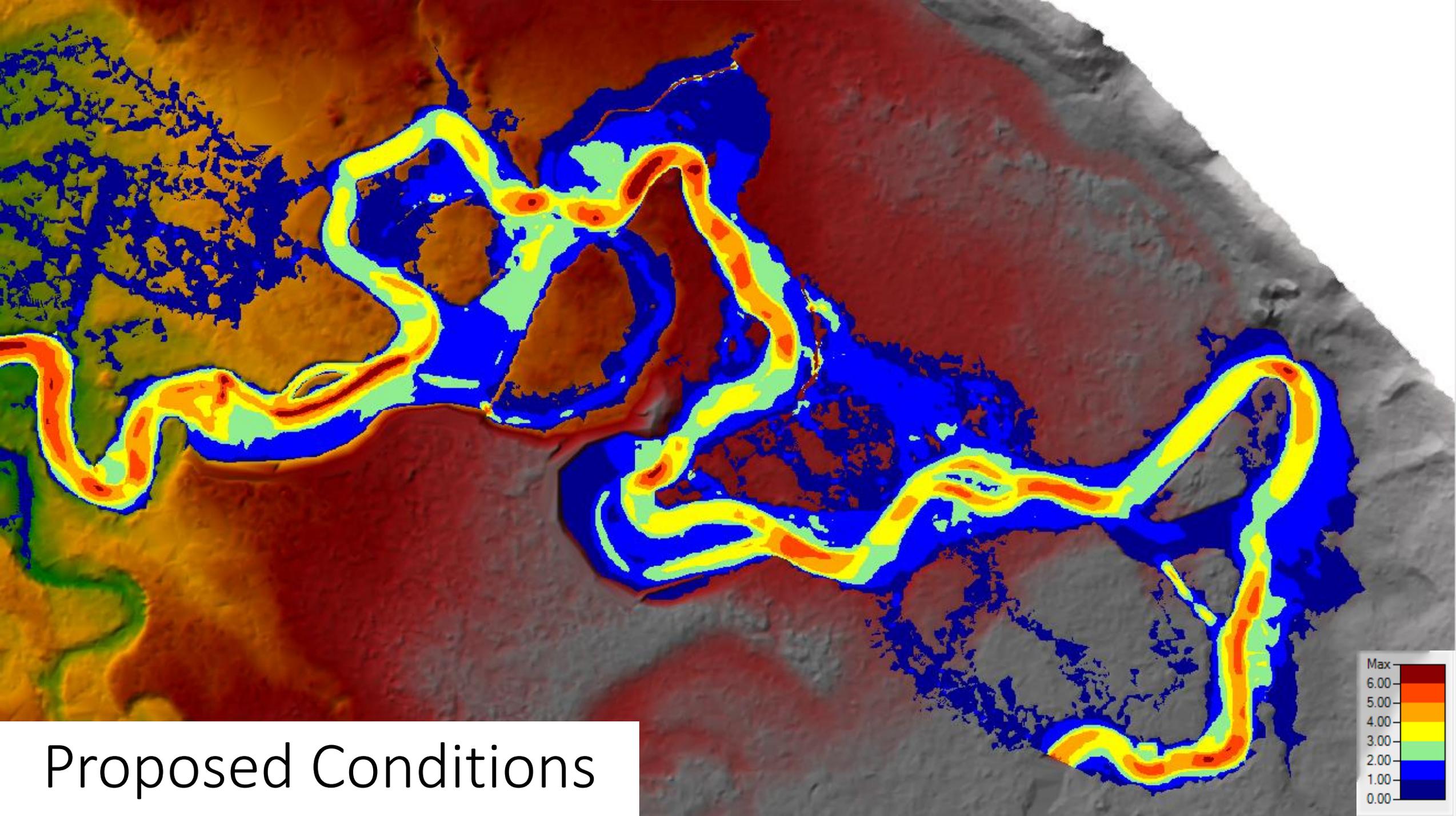


EVR SR-3 1.5-Year Velocities for Juveniles



Existing Conditions





Proposed Conditions